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## A new North American species of *Microrhagus* Dejean, 1833 (Coleoptera: Eucnemidae), with a key to the Nearctic species

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(Coleoptera: Eucnemidae), with a key to the Nearctic species

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A new North American species of *Microrhagus* Dejean, 1833  
(Coleoptera: Eucnemidae), with a key to the Nearctic species

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**Abstract.** *Microrhagus brunneus*, **new species** (Coleoptera: Eucnemidae: Melasinae: Dirhagini) is described from Arkansas, Indiana, Kentucky, Louisiana, North Carolina, Oklahoma and Wisconsin. Dorsal, ventral and lateral habitus, along with male aedeagus are illustrated and a new key is provided to distinguish the new species from the four other *Microrhagus* species in the region.

## Introduction

While preparing information for a paper project, a large series of eucnemid specimens from the University of Wisconsin-Madison (WIRC) and the author's personal collections (RLOC) previously identified as *Microrhagus triangularis* (Say, 1823) were re-evaluated. The specimens were collected during the 2009-2011 emerald ash borer (*Agrilus planipennis* Fairmaire) survey seasons. Within the series, 46 specimens were found to belong to a new species. Further evaluation of all *Microrhagus* Dejean specimens from my collection, Brian Baldwin collection (BBC) and the Louisiana State University Insect Collection (LSUIC) revealed additional specimens of the new species from six states outside of Wisconsin. The new species brings the number of Nearctic *Microrhagus* species to five.

## Materials and Methods

Habitus and genitalic images were taken with a JVC KY-F75U digital camera attached to a Leica® Z16 APO dissecting microscope with apochromatic zoom objective and motor focus drive, using a Synchroscope AutoMontage® System and software, resulting image stacks were processed using CombineZP®. Genitalia were dissected following immersion of sectioned abdomen in KOH for three hours at a concentration of one tablet in 40 ml of water. Genitalia were suspended in Germ-X® hand-sanitizer for imaging. Abdomen was secured on a cardstock and pinned beneath the corresponding specimen. Dissected genitalia were stored in a microvial filled with glycerine and also pinned beneath the abdomen and corresponding specimen.

Label data for types are reported verbatim; data are condensed for paratypes. Codens for collections in which specimens are deposited include:

**BBC** — Brian Baldwin Collection, Jessieville, AR  
**LSUIC** — Louisiana State University Insect Collection, Baton Rouge, LA  
**RLOC** — Robert L. Otto Collection, Madison, WI  
**WIRC** — University of Wisconsin Insect Research Collection, Madison, WI

## *Microrhagus* Dejean, 1833

**Diagnosis.** Dirhagini, with apex of clypeus trilobed and more than twice as wide as the distance between antennal sockets; poorly defined deep hypomerall pits near procoxae; interrupted lateral pronotal ridges; notosternal antennal grooves well developed, usually with smooth surfaces; male protarsomere 1 simple, with apical sex combs; metacoxal plates narrowing laterad; evenly rounded apex of last ventrite; male aedeagus dorsoventrally compressed; lateral lobes bilobed and directed dorsocaudad; median lobe simple, deeply and widely bifurcate apically; flagellum complex and tubular.



**Key to the species of Nearctic *Microrhagus* Dejean** (modified from Muona 2000)

1. Anterior lateral hypomeral ridge elongate, extending up to 1/2 the length of the pronotum (Fig. 1) ..... **2**  
 — Anterior lateral hypomeral ridge short, ventrally bent and less than 1/4 the length of the pronotum (Fig. 2) ..... **3**
2. Posterior lateral hypomeral ridge short, extending up to 1/3 the length of the pronotum (Muona 2000, fig. 51) ..... ***M. pectinatus* LeConte**  
 — Posterior lateral hypomeral ridge elongate, extending up to 1/2 the length of the pronotum (Fig. 1; Muona 2000, fig. 54) ..... ***M. subsinuatus* LeConte**
3. Posterior lateral pronotal ridge elongate, extending at least 1/2 the length of the pronotum (Fig. 6 and 11) ..... **4**  
 — Posterior lateral pronotal ridge short, extending up to 1/4 the length of the pronotum (Fig. 9) ...  
 ..... ***M. audax* Horn**
4. Antennae dark brown to black, moderately serrate (Fig. 10) ..... ***M. triangularis* (Say)**  
 — Antennae medium brown, very strongly and asymmetrically serrate (Fig. 5) .....  
 ..... ***M. brunneus* Otto, new species**

***Microrhagus brunneus* Otto, new species**

Figures 2-7

**Diagnosis.** The short anterior lateral pronotal ridge will distinguish this species from *M. pectinatus* and *M. subsinuatus*. The elongate posterior lateral pronotal ridge will distinguish this species from *M. audax*, and the medium-brown, strongly serrate, almost ramose antennae will distinguish it from *M. triangularis*.

**Description. Male holotype:** Body subcylindrical, moderately elongate and tapering towards the elytral apex; uniformly blackish brown with the elytral suture area infuscate reddish; antennae and legs medium brown; head, pronotum and elytra clothed with short, yellow decumbent setae (Fig.3). Length, 3.00 mm. Width, 1.00 mm.

**Head:** Closely punctate, subspherical with convex frons; surface shiny; apical margin of clypeus tricarinate, about 2.5 times wider than base; mandibles stout, bidentate, densely punctate.

**Antennae** (Fig.5): Very strongly serrate, reaching about 3/4 the length of the body, setose. Antennomere III slightly longer than IV; antennomeres IV-X each asymmetrically triangular, subequal and about as long as wide; antennomere XI asymmetrical, slightly longer than X.

**Pronotum:** Closely punctate; surface shiny; as long as wide, with short hind angles; basal 3/4 parallel-sided; pronotum slightly convex anteriorly; disc simple, with median impression; base with short, median ridge above scutellum; laterally (Fig. 2 and 6) with two ridges; anterior lateral hypomeral ridge short, ventrally bent, less than 1/4 the length of pronotum; posterior lateral hypomeral ridge extending at least 2/3 the length of pronotum.

**Scutellum:** Slightly rugose, oblong, triangular and distally rounded.

**Elytra:** Faintly indicated striae present; interstices slightly elevated, very closely punctate.

**Legs:** First tarsomere longer than the combined lengths of the remaining four on mesothoracic and metathoracic tarsi; tibiae rounded in cross section; lateral surfaces of mesothoracic and metathoracic tibiae with single spines; metathoracic tarsomeres I-II simple; metathoracic tarsomeres III-IV truncate and excavated; metathoracic tarsomere V elongate with simple claws.

**Venter** (Fig. 4): Punctate, with decumbent yellow setae; hypomera with notosternal antennal grooves; metepisternum caudally widened; metacoxal plates medially 2.5 times as wide as laterally.

**Male genitalia** (Fig. 7): Basal piece oblong, elliptical; basally narrowed, apical 3/4 widened; lateral lobes short, simple, apically narrowed; secondary lateral lobes fused with lateral lobes; flagellum complex, apices elongate; median lobe widened, elongate, apically bilobed.

*Female allotype*: 3.25 mm long; antennae strongly serrate, not quite ramose as in male, reaching 2/3 the length of the body; legs and antennae slightly darker; pronotal disc with stronger median impression.

**Variation.** Fifty-eight adult paratypes were examined. Twenty-seven male paratypes varied in length from 2.25-3.50 mm. Thirty-one female paratypes varied in length from 3.00-4.00 mm. Females are on average slightly larger than males. Female antennae are strongly serrate and stouter, similar to those in male *M. audax*. Female antennae reach up to two-thirds the length of its body. Antennae and legs in some specimens are darker. Posterior lateral pronotal ridge in both sexes varies from 1/2 to 3/4 the length of the pronotum. Pronotal basal keel above the scutellum shows some degree of structural variation, ranging from a weaker keel to a more pronounced basal keel. The median impressed line and circular foveae exhibit some variability on the pronotal disc. The impressions are more pronounced in some, while absent in a few specimens. Color intensity along the sutural areas of the elytra is slightly variable. Some male and female specimens show a uniform dark blackish-brown coloration of the elytra; typical in all other Nearctic *Microrhagus* species.

**Type material.** **Holotype**, male, with label data: “WI: Lafayette Co., along County Road U, N42.54630°, W-90.23315°, EABT108073, 7 July 2010, Robert L. Otto” / “Taken from EAB prism trap baited with manuka oil” / “**HOLOTYPE**:, *Microrhagus, brunneus*, Otto, det. R.L. Otto, 2013” (♂ handwritten behind species name on label)[red printed label]. **Allotype**, female, with label data: “WI: Oconto Co., along County Road M, N45.00508°, W-088.29438°, EABT014674, 29 June 2010, Robert L. Otto” / “Taken from EAB prism trap baited with manuka oil” / “**ALLOTYPE**:, *Microrhagus, brunneus*, Otto, det. R.L. Otto, 2013” (♀ handwritten behind species name on label)[yellow printed label]. Holotype and allotype are retained in the collection of the University of Wisconsin-Madison (WIRC).

**Paratypes.** 58, from the following localities: 1, **ARKANSAS: Garland Co.:** FS Camp Clearfork (BBC); 1, Jessieville (BBC); 2, **Polk Co.:** Mena (BBC, LSUIC); 2, **Pulaski Co.:** Little Rock (BBC, RLOC); 1, **INDIANA: Howard Co.:** NW Howard Co (LSUIC); 1, **KENTUCKY: Floyd Co.:** Wheelright area (LSUIC); 1, **LOUISIANA: Iberville Par.:** Rosedale (LSUIC); 1, **Natchitoches Par.:** 1 mi NNE Lotus (LSUIC); 1, **NORTH CAROLINA: Haywood Co.:** Cataloochee (LSUIC); 1, **Swain Co.:** nr. Proctor (LSUIC); 2, **OKLAHOMA: Grady Co.:** Tuttle, Silver Ridge Rd (BBC, LSUIC); 1, **WISCONSIN: Door Co.:** N45.19289383°, W087.09536872° (WIRC); 1, N42.74865371°, W087.66577123° (RLOC); 1, **Fond du Lac Co.:** Long Lake, Kettle Moraine St. For. (WIRC); 1, **Forest Co.:** along Potawatomi Trl. (WIRC); 1, **Grant Co.:** along County Road VV (WIRC); 1, village of Cassville (WIRC); 1, along McAdam Road (WIRC); 1, **Jefferson Co.:** along County Road Y (WIRC); 1, **Lafayette Co.:** along County Shop Road (WIRC); 3, along Dimmicks Road, (RLOC, WIRC); 4, along County Road U (RLOC, WIRC); 4, along Dunbarton Road (RLOC, WIRC); 1, **Oconto Co.:** along Four Towns Road (RLOC); 1, along Janik Road (RLOC); 1, along County Road G (WIRC); 1, along County Road R (WIRC); 1, along Rugg Road (WIRC); 1, along Tappa Road (WIRC); 1, **Outagamie Co.:** along McCarthy Road (RLOC); 3, along State Highway 47 (RLOC); 1, Patriot Park (RLOC); 1, **Shawano Co.:** along State Highway 32 (WIRC); 1, along Sycamore Road (WIRC); 1, along Hickory Road (WIRC); 1, along County Road F (WIRC); 1, along Townline Road (WIRC); 1, along County Road BB (WIRC); 1, **Waupaca Co.:** along Big Eddy Road (RLOC); 2, **Winnebago Co.:** along Irish Road (RLOC); 1, Arrowhead Park (RLOC); 2, along Fairview Road (RLOC); 1, along Oakwood Avenue (RLOC).

Each specimen labeled: “**PARATYPE**:, *Microrhagus, brunneus*, Otto, det. R.L. Otto, 2013” (either ♂ or ♀ handwritten behind species name on each label)[yellow printed label]. All paratypes are deposited in BBC, LSUIC, RLOC, and WIRC.

**Distribution.** The species is known from Arkansas (three counties), Indiana (one county), Kentucky (one county), Louisiana (two parishes), North Carolina (two counties), Oklahoma (one county) and Wisconsin (11 counties).

**Biology.** Most of the specimens collected have been taken from purple prism traps (Synergy Semiochemicals; British Columbia) baited either with Manuka Oil, Z3-Hexen-1-ol or with the

combination of Manuka Oil and Phoebe Oil placed in ash (*Fraxinus* sp., Oleaceae) trees during the emerald ash borer (EAB, *Agrilus planipennis* Fairmaire, Buprestidae) survey seasons in Wisconsin from 2009 to 2011. The eucnemid have also been taken from a sticky trap placed on a girdled ash tree. Other specimens have been collected from a flight intercept trap, Lindgren funnel trap, hanging sugar trap, blacklight, combination of mercury vapor and blacklight, Malaise Trap and U.V. light trap. Immature stages are unknown.

**Etymology.** The name of the new species is derived from the overall antennal and leg color.

**Discussion.** *Microrhagus* is one of several large genera within the Eucnemidae, consisting of approximately 100 species, distributed largely in the subtropical and tropical regions around the world. In the Nearctic, four species were known prior to this discovery of a new species.

Muona (1996) separated *M. audax* from *M. triangularis* based on the basal depressions of the pronotal disc, surface luster, and antennal structures for each sex. Muona (2000) relied largely on antennal structure to distinguish these species in the key. He further distinguished both species on the color of the legs and antennae, as well as antennal structures in each description. In order to facilitate identification of the new species, a newly updated key has been constructed to replace Muona's key, partly on the basis of lateral pronotal ridges and characteristics of the antennal segments.

Strongly serrate and lighter colored antennal segments present in typical specimens of *M. brunneus* would run into *M. audax* in Muona's key. Posterior lateral pronotal ridge are quite different between these two species, being shorter in *M. audax* and longer in *M. brunneus*. Antennal segments in female *M. brunneus* are more strongly serrate than females of *M. audax*. Female *M. brunneus* are superficially similar to male *M. audax* (Fig. 8-9) and can be distinguished by overall lengths of their antennae proportional to body length, posterior lateral pronotal ridge, and the presence of apical sex combs on the first prothoracic tarsomere in male *M. audax*.

Variant specimens, especially females with darker colored legs and antennae would key to *M. triangularis*. Male and female antennae of *M. brunneus* are distinctly more serrate than *M. triangularis*. Male *M. brunneus* antennae are asymmetrically serrate with almost ramose segments; antennae are simply serrate in both male (Fig. 10) and female *M. triangularis*. *Microrhagus brunneus* can also be separated from *M. triangularis* based not only on the antennal structures, but also the pronotal disc. Pronotal disc in *M. triangularis* is simple and convex. Median impressed line and in some specimens, a pair of circular foveae are present on *M. brunneus*.

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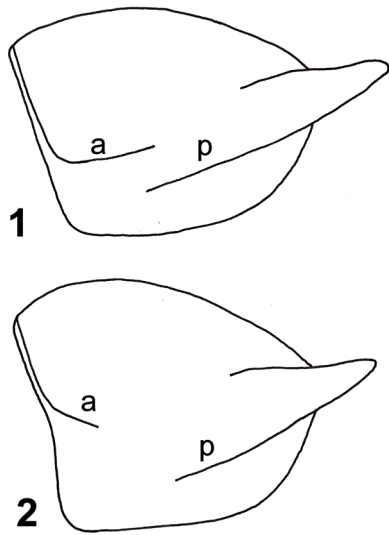
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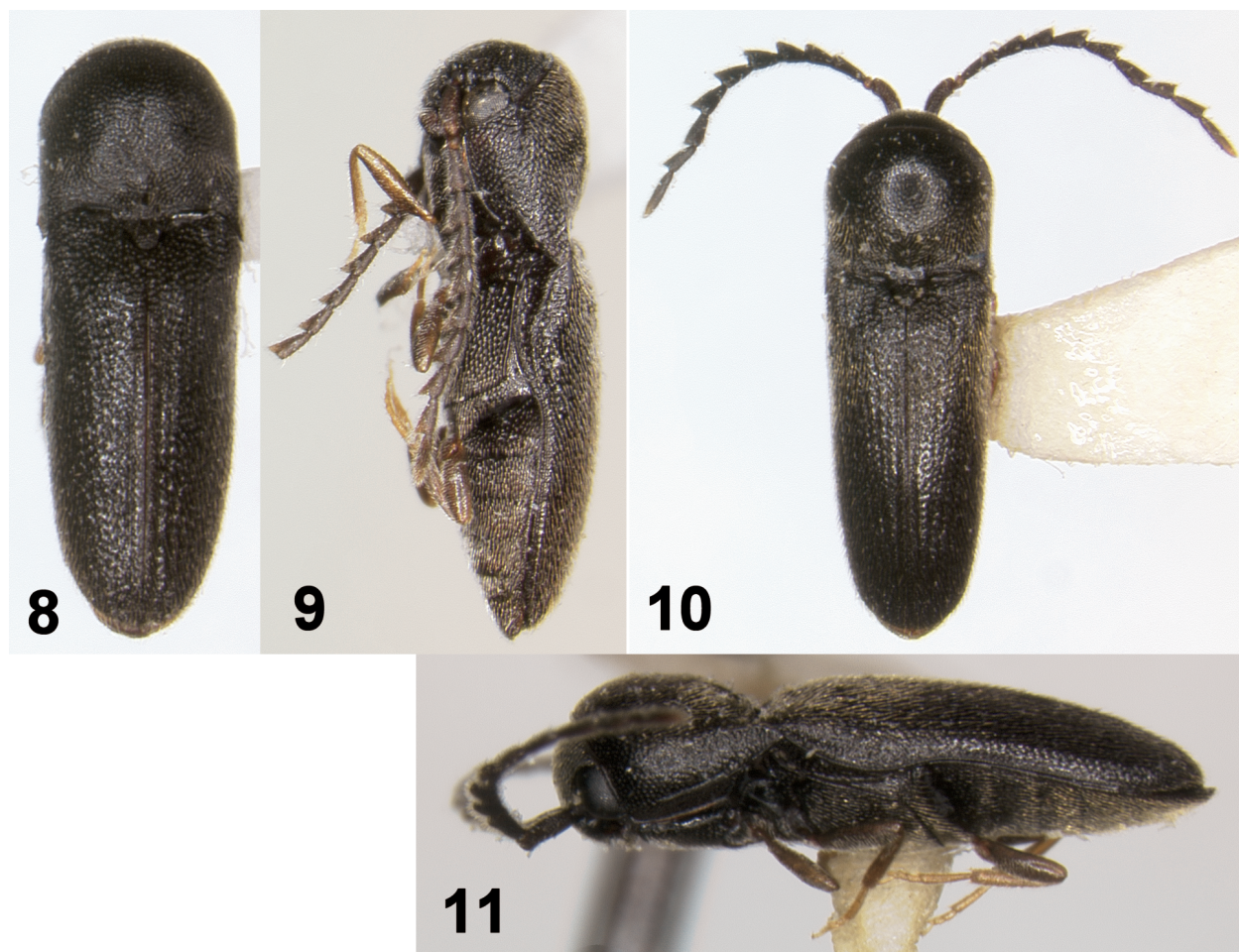




**Figures 1-2.** Pronotum, lateral side (a = anterior lateral pronotal ridge; p = posterior lateral pronotal ridge). **1)** *Microrhagus subsinuatus* LeConte. **2)** *Microrhagus brunneus* Otto.



**Figures 3-7.** *Microrhagus brunneus* Otto. **3)** Dorsal of holotype. **4)** Ventral of holotype. **5)** Antenna of holotype. **6)** Lateral of holotype. **7)** Aedeagus of paratype, dorsal view.



**Figures 8-11.** 8-9) *Microrhagus audax* Horn. 8) Dorsal. 9) Lateral. 10-11) *Microrhagus triangularis* (Say). 10) Dorsal. 11) Lateral.